TLF CREEK BRIDGE
Yellowstone Roads and Bridges
Spanning TLF Creek on Northeast Entrance Road
Yellowstone National Park
Park County
Wyoming

HAER No. WY-36

BLACK & WHITE PHOTOGRAPHS

WRITTEN HISTORICAL & DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
U.S. Department of the Interior
P.O. Box 37127
Washington, DC 20013-7127

Rocky Mountain Regional Office
National Park Service
U.S. Department of the Interior
P.O. Box 25287
Denver, Colorado 80225

HAER
WYO
15-YELNAP,
19-

HISTORIC AMERICAN ENGINEERING RECORD

TLF CREEK BRIDGE
~~HAER WY-36~~

HAER WY-36

Location:	Spanning TLF Creek on Northeast Entrance Road, 3.8 miles west of the park boundary at the northeast entrance station, Yellowstone National Park, Park County, Wyoming UTM: Abiathar Peak, WY, Quad. 12/574350/4981550
Date of Construction:	1936
Owners:	Yellowstone National Park, National Park Service
Use:	Vehicular bridge
Designer:	E.T. Larson, Bureau of Public Roads
Builder:	McLaughlin Construction Company, Livingston, Montana
Significance:	TLF Creek Bridge typifies the early design philosophy of the National Park Service, which was to use indigenous materials to harmonize man-made features with their natural surroundings. This philosophy is embodied in many of the park's Rustic Style buildings and structures.
Project Information:	Documentation of TLF Creek Bridge is part of the Yellowstone Roads and Bridges Recording Project, conducted during the summer of 1989 by the Historic American Engineering Record, a division of the National Park Service, under the co-sponsorship of Yellowstone National Park, the NPS Roads and Bridges Program, and the NPS Rocky Mountain Regional Office, Denver. Historical research and written narrative by Mary Shivers Culpin, Historian, NPS Rocky Mountain Regional Office. Engineering description by Steven M. Varner, Virginia Polytechnic Institute. Edited and transmitted by Lola Bennett, HAER Historian, 1993.

HISTORY OF NORTHEAST ENTRANCE ROAD

(See HAER WY-12, Lamar River Bridge.)

DESIGN AND CONSTRUCTION OF TLF CREEK BRIDGE

Construction of TLF Creek Bridge was part of the reconstruction of the Tower Junction--Cooke City road, in which winding alignment, steep grades, and ineffective drainage structures were to be corrected. The location survey, completed during the autumn of 1933 by A.O. Stinson of the Bureau of Public Roads (BPR), revealed that the drainage conditions on the east side of the creek presented a lesser problem due to the fact that the Baronett Peak was more precipitous and closer to the proposed road than the Abiathar Peak on the east side of the creek. It was determined that in all probability the spring run-off from melting snow would be faster and more destructive from Baronett Peak, which is exposed to the sun.

Completed during the spring of 1934, the original plans called for multi-plate arches with masonry headwalls but these plans were rejected after the National Park Service estimated the cost of a design that would meet their requirements. New plans were drawn after a field inspection by park officials and regional and district BPR officials. The new designs for the project included single-span concrete bridges of simple design for three of the larger washes, and concrete box culverts with masonry headwalls for the smaller drainages.

During the 1934 and 1935 grading contract, channels were widened and deepened, intercepting laterals and dikes were constructed at different points in order to confine the water to its present course. Because of frequent seasonal floods, additional improvements to the channels were made. Another measure taken to prevent deposition of debris at the bridge site was excavation to a uniform gradient along the channel.

On June 19, 1936, the McLaughlin Construction Company of Livingston, Montana, was awarded the contract for construction of three bridges and three concrete box culverts. The contractor set up a temporary camp--several portable buildings of sheathing and tar paper construction--in a small open park between the RWC Creek Bridge and the FHWA Creek Bridge. All of the rations and supplies were purchased from the National Park Service and stored at the park's storehouse at Mammoth Hot Springs. The crew began their project on July 2, 1936. A ⅝-yard dragline and a tractor with attached bulldozer were used in the structural excavation. However, rainy conditions caused the excavated area to be filled in with boulders and silt. Prior to the setting of the forms, all of the debris had to be removed by laborious and expensive hand labor. Rainy weather continued until the middle of September, which caused problems in the forming and pouring of the substructure.

An approved two-bag mixer mixed the concrete which was then compacted in the forms by a mechanical vibrator. The concrete for the abutments was poured by tremies. After the concrete cured, two coats of Keramik stain were sprayed on the surface which produced a more uniform distribution of color than if the stain had been applied with hand brushes. The stain formula was one coat of a dilute solution (one pound per gallon of water) of medium brown, and a second coat of green mixed in the proportion of two pounds per gallon of water. The appearance of the stain, which developed its color by chemical reaction, varied from structure to structure, probably due to different atmospheric conditions or the length of time the concrete had cured. The use of hand-sawn lumber caused the surface to appear crude and rough.

A crushing and screening plant at Cooke City produced the aggregate for the project. The same plant produced the aggregate for the recently completed Cooke City to Red Lodge, Montana, road (Beartooth Highway). The cement came from Trident, Montana; the road oil from Laurel, Montana; and the reinforcing steel from St. Paul, Minnesota. During July, lodgepole pine logs

were cut for curing. The logs were cut from a stand east of the TLF Creek Bridge site. The contractor placed and secured the guard rail posts to the forms prior to pouring the concrete in order to achieve good alignment. In September, a ⅜-yard Austin Badger shovel completed the channel improvements and the bridge approach fills. The borrow, which was obtained from the channels, was hauled by two 1½-ton trucks.

The bridge, which was accepted on October 31, 1936, was completed in 124 days, or approximately 83 percent of the allowable 150 days specified in the contract. The unskilled and intermediate labor pool came through the National Reemployment office at Mammoth Hot Springs with most of the men coming from Wyoming, Idaho and Montana. Unskilled laborers received the minimum wage of $.55 per hour with a few outstanding employees receiving raises above the minimum. The men paid $1.00 per day for board.[1]

DESCRIPTION

TLF Creek Bridge is a small reinforced-concrete slab bridge which carries Northeast Entrance Road over TLF Creek, 3.8 miles west of the northeast entrance. The bridge, whose design load was 15 tons, is of one span with a maximum span length of 20' from center of support to center of support. The structure length is 23' from end of backwall to end of backwall. The deck width is 28' while the bridge roadway from curb to curb is 25' wide.[2] Looking west, the bridge has a northward curve of 2 degrees 30 minutes.

The slab of this bridge is reinforced with steel bars. The bars in the slab are all deformed with an allowable tension of 16,000 psi. This allowable tension of 16,000 psi means the reinforcement was not up to a typical 1989 standard of 20,000 psi for allowable stress. The reinforcement itself is fairly typical even for a bridge of today. One-square-inch bars run longitudinally on the top and bottom at 6-inch centers to take up the tension generated by moving loads on top of the slab. Transverse reinforcing consists of ⅝"-diameter bars at 2-foot centers to distribute the loads laterally. The slab thickens at its edges for a slightly arched effect which also gives added concrete to take up the higher shear near the ends although no additional reinforcement is added to take up this shear. The concrete in the deck is of Class "D". "D" refers to the proportion of cement in the mix. "A" has the highest proportion. The concrete has an allowable compression of 650 psi.[3]

Nine inches of asphalt surfacing covers the deck. The approach from the west has a grade going uphill at 5 percent, and leaving the bridge to the east the road goes downhill 1.40 percent. The grade on the bridge goes uphill 1.43 percent from west to east.[4]

The abutments of TLF Creek Bridge are flared U-shape. They spring from firm material. The wing walls, which extend farther on the upstream side, are 17' to 24' long while on the downstream side, they are 12' to 14' long.[5]

The guard rail consists of 10"-diameter log posts, 7'-2" on center. They rise 2'-4" above the curb and are sunk 1'-6" into an 8"-diameter pipe in the curb. The rail is an 8"-diameter log, 1'-8" high. It is attached to the post on the roadway side by a ¾"-diameter bolt countersunk on the roadway side.[6]

The estimated quantities of materials used in this bridge are as follows:

Class "A" Concrete	159 cu. yds.
Class "D" Concrete	39 cu. yds.
Reinforcing Steel	19,000 lbs.
Excavation	550 cu. yds.[7]

The bridge cost a total of $7,241.50.[8]

ENDNOTES

1.L.C. Foreman, "Final Construction Report (1936) on Tower Junction--Cooke City Highway Project RTEC 8-A1, Small Bridges and Culverts, Yellowstone National Park, State of Wyoming," 29 March 1937.

2."Bridge Inspection Report, Station 198+85 Bridge over TLF Creek, August 10, 1986." U.S. Department of Transportation, Federal Highway Administration, Western Division.

3."Bridge Inspection Report, Station 198+85 Bridge over TLF Creek".

4.*Ibid.*

5.*Ibid.*

6.*Ibid.*

7.*Ibid.*

8.Foreman, "Final Construction Report on Tower Junction--Cooke City Highway Project."